

What is claimed is:

1. A spectroscopic method for analysing isotopes contained in gas to be measured by identifying and quantitatively measuring isotopes by using wavelengths of absorption spectra absorbed in existence of said isotopes, the improvement is characterized in that the method comprises the steps of

using a semiconductor laser beam as a beam source for said wavelengths of said absorption spectra; and

using a reference gas for identification of said isotopes, wherein said reference gas contains collating components having two wavelengths of well-known absorption spectra in wavelength band close to said wavelengths of absorption spectra of said isotopes.

2. The spectroscopic method for analysing isotopes according to claim 1, wherein

said collating components contained in said reference gas is hydrogen bromide; and

said collating components of said two wavelengths of said well-known reference absorption spectra are  $H^{79}Br$  and  $H^{81}Br$ .

3. The spectroscopic method for analysing isotopes according to ~~claim 1 or 2~~ <sup>claim 1</sup>, wherein

said isotopes to be measured are isotopes of carbon dioxide gas.

4. The spectroscopic method for analysing isotopes according to claim 1, wherein

said semiconductor laser beam source emits a beam of spectra having wavelength zone of 2000 nm band.

5. The spectroscopic method for analysing isotopes according to claim 2, wherein

said semiconductor laser beam source emits a beam of spectra having

wavelength zone of 2000 nm band.

6. The spectroscopic method for analysing isotopes according to claim 3, wherein

said semiconductor laser beam source emits a beam of spectra having  
5 wavelength zone of 2000 nm band.

7. The spectroscopic method for analysing isotopes according to claim 3, wherein

said isotopes of carbon dioxide gas as sample gas are  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$ ;  
and

10 said  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$  have pairs of following wavelengths

[a wavelength of isotope  $^{12}\text{CO}_2$  (nm)]:[a wavelength of isotope  $^{13}\text{CO}_2$  (nm)]

2054.37 : 2053.96

2044.65 : 2044.49

2035.34 : 2035.63

15 2010.18 : 2010.29

2002.51 : 2002.54

1995.99 : 1996.10

and a abundance ratio is measured by an absorbance in accordance with said a  
respective pair of wavelengths.

20 8. The spectroscopic method for analysing isotopes according to claim 4, wherein

said isotopes of carbon dioxide gas as sample gas are  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$ ;  
and

said  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$  have pairs of following wavelengths

25 [a wavelength of isotope  $^{12}\text{CO}_2$  (nm)]:[a wavelength of isotope  $^{13}\text{CO}_2$  (nm)]

2054.37 : 2053.96

2044.65 : 2044.49

2035.34 : 2035.63

2010.18 : 2010.29

5 2002.51 : 2002.54

1995.99 : 1996.10

and a abundance ratio is measured by an absorbance in accordance with said a respective pair of wavelengths.

9. The spectroscopic method for analysing isotopes according to claim 5,

10 wherein

said isotopes of carbon dioxide gas as sample gas are  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$ ;

and

said  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$  have pairs of following wavelengths

[a wavelength of isotope  $^{12}\text{CO}_2$  (nm)]:[a wavelength of isotope  $^{13}\text{CO}_2$  (nm)]

15 2054.37 : 2053.96

2044.65 : 2044.49

2035.34 : 2035.63

2010.18 : 2010.29

2002.51 : 2002.54

20 1995.99 : 1996.10

and a abundance ratio is measured by an absorbance in accordance with said a respective pair of wavelengths.

10. The spectroscopic method for analysing isotopes according to claim 6,

wherein

said isotopes of carbon dioxide gas as sample gas are  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$ ;

and

said  $^{12}\text{CO}_2$  and  $^{13}\text{CO}$  have pairs of following wavelengths

5 [a wavelength of isotope  $^{12}\text{CO}_2$  (nm)]:[a wavelength of isotope  $^{13}\text{CO}_2$  (nm)]

2054.37 : 2053.96

2044.65 : 2044.49

2035.34 : 2035.63

2010.18 : 2010.29

2002.51 : 2002.54

1995.99 : 1996.10

and a abundance ratio is measured by an absorbance in accordance with said a respective pair of wavelengths.

11. The spectroscopic method for analysing isotopes by using a semiconductor,

15 which comprises the steps of

identifying said isotopes by using absorption spectra of hydrogen bromide as reference gas having well-known collating components, said absorption spectra having wavelength band according to claim 4; and

20 identifying existence of impurities generating absorption spectra at said wavelength band.